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1. Narrative

RV Poseidon left the port of Las Palmas (Gran Canaria) on February, 24, 2010 at 10:00 pm and sailed in southwesterly direction to the study area off Cape Blanc, Mauritania (Fig. 1). We planned to perform optical, microbial and geochemical studies off Cape Blanc as well as the exchange of two sediment trap moorings ($CBi_{eutrophic}$ and $CB_{mesotrophic}$) which were deployed during RV MERIAN 11 cruise the year before in the same area (Fig. 1). We also intended to deploy one drifting array (DF-1) at the eutrophic sediment trap site off Cape Blanc for a few days. Additionally, a particle camera was planned to be launched to measure the distribution and size of marine snow aggregates. A small ROV Cherokee was scheduled to be deployed for the observation of larger marine snow particles and the measurement of in situ particle sinking rates. On board were 8 scientists from Bremen University, the Marum and the MPI as well as one observer from Morocco (INRH, Casablanca) and one from Mauritania (IMROP, Nouadhibou).

On Friday afternoon, 26th of February, we reached the first station about 200 nm off Cape Blanc at about 21°16.N and 20°51.W (Fig. 1). After performing two short tests with the new particle camera ParCa-Pro with a SBE-19 CTD (now equipped with oxygen, chlorophyll fluorescence and turbidity sensors), we recovered the sediment trap mooring CB-20 within three hours. The upper particle trap had worked perfectly, the lower failed. This mesotrophic study site is located at the edge of the coastal upwelling filament off Cape Blanc (Mauritania). Later the particle camera ParCa-Pro was launched to 2000 m water depth and we deployed 8 in situ-pumps (ISP) to sample suspended particles for 4 hours in specific depth horizons. They were recovered in the early morning of Saturday, 27th and had worked perfectly, except one. Lateron, we used the ships' rosette (ROS) with a SBE-3 CTD to collect water samples down to 4120 m water depth. Then we redeployed the sediment trap mooring CB-21 at the old position of CB-20.

After performing some more camera testing for adjusting the focus, we left this site to sail eastward for the eutrophic sediment trap mooring site CBi-7. There, after two more camera tests, we made a depth profile down to 2720 m. After lunch, the mooring was released and picked up shortly afterwards. We recovered the MSD (Multi-Sensor-Device) platform with various sensors and ACP (Acoustic Current Profiler) which had collected video observations of larger particles over almost two years. The upper and lower trap had worked perfectly collecting 38 and 19 samples of particulates. In the afternoon, we deployed a drifting array with a sediment trap at 400 m which had four samples prepared with different preservatives and gels to preserve larger marine snow aggregates. The top buoy had a satellite transmitter, unfortunately we received no signal after the deployment. We finally launched the rosette with CTD down to 2600 m. Due to increasingly rougher weather conditions, we could not deploy the in situ-pumps here and sailed farther

eastwards to station 3 which was about 50 miles of the coast of Mauritania at about 760 m water depths. In the early morning of March, 1st, we launched the ParCa-Pro+CTD down to 720 m. We then sailed to the west and south for searching the deployed drifting trap which was not successful.

During the night to March 2nd, we sailed in southeasterly direction to station 4 which we reached in the early morning. We started with two ParCa-Pro+CTD profiles down to 3300 m and 2000 m and then deployed the ROS+CTD down to 1000 m and 65 m. We had some failure and could not close some of water collectors of the rosette. In addition, the first deployment of the camera was not successful. We then sailed back in northeasterly direction to the eutrophic mooring site CBi (station 5) which we reached on March 3rd at 13:00 starting with the deployment of two sediment traps. In the evening, we launched 8 in situ-pumps which pumped suspended particles for three hours. We sailed farther eastward to station 6 where we deployed the ParCa-Pro and CTD down to 1690 m during the early morning of March 4th. Lateron, we sailed to the east to the 760 m station where we launched the ROS+CTD down to 700 m. After the problems with the water collectors of the ROS+CTD at station 4, the instrument worked perfectly due to some repair and cutting the cable. We sailed back 8 miles to the east of the mooring site CBi where we deployed the ParCa-Pro+CTD down to 2250 m in the evening of March, 4th. During the night we moved to the east to the shelf area to investigate the particle and bacterial concentrations in the water column (station 9). In the early morning of March, 5th, we launched the particle camera to 250 m followed by the ROS+CTD for collecting water. Finally, we moved 25 miles to the west to station 10 at about 760 m water depth for deploying the in situ-pumps. In the late afternoon of March 5th, we left the study area off Cape Blanc heading for Las Palmas which we reached in the early morning of March 8th.

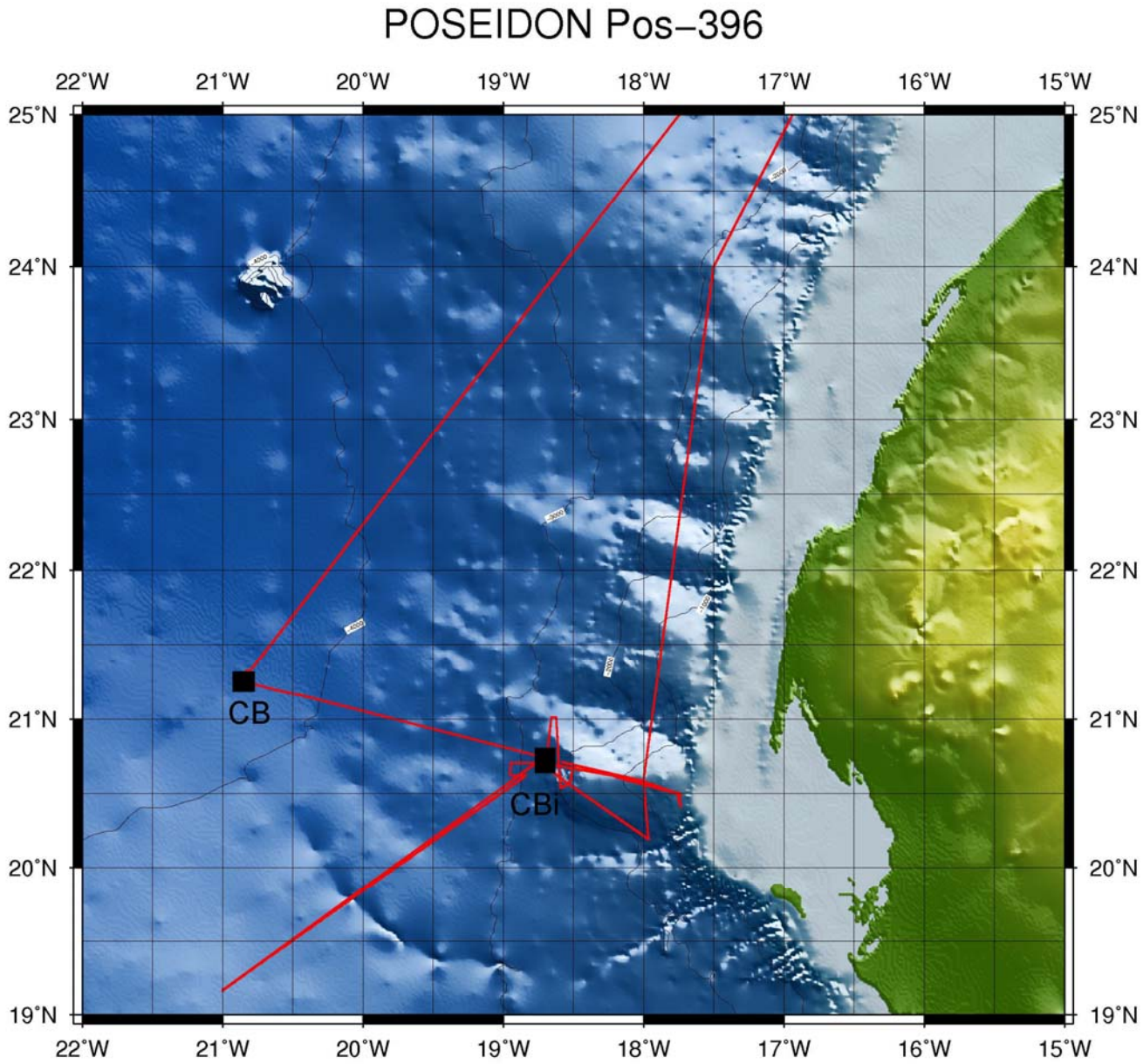

Fig. 1. Cruise track of POS 396. The locations of the two sediment trap moorings CBi (eutrophic) and CB (mesotrophic) are also indicated.

2. Preliminary Results

2.1. Atmospheric Sciences

2.1.1. Aerosol sampling *(M. Klann)*

Terrigenous sediments deposited in marine sediments are a mixture of a pelagic component brought in by the wind and a hemipelagic component brought in by rivers and supplied from the shelf. The analysis of eolian dust allows the estimation of aridity in eolian source regions and the intensity of the transporting winds through grain-size measurements. Eolian dust can be used to reconstruct changes in continental climate by using the marine sediment record. For validating the terrigenous sediment fraction in marine sediment cores, present-day dust samples were collected during the cruise.

The collecting was done with a dust-collector which was placed on the observation deck. An engine inside both dust-collectors sucks the surrounding air. This air passes through a filter in which the dust is collected. The dust-collectors are connected with a wind vane to prevent particles from the funnel reaching the filters. If the dust-collectors have no connection with the sensor, the engines stop automatically. Two kinds of filters are used for the investigations. The glass fiber-filter is for analysing the organic constituents in the dust, while the cellulose-filters is used for grain-size measurements on dust particles as well as chemical and mineralogical analysis. Ten samples were taken during the cruise (Table 1).

Table 1. Samples collected for dust investigations.

Filter No.			**Date**	**Time**	**Position**		**Rain**	**Ship** [1]		**Wind** [1]		**Counter**
	Cell**		2010	UTC	Long (W)	Lat (N)	yes/no	Knots	Heading	Direction (°)	Speed (m/s)	Cell
1	**1**	**Start**	25. Feb	08:09	17°27.847	25°19.90	no	10,6	216,7	44	5,6	0,00
		Stop	26. Feb	08:13	20°08.511	22°07.60	no	9,6	215,8	84	7,9	2,31
2	**2**	**Start**	26. Feb	08:27	20°09.952	22°05.86	no	9,8	214,4	85	7,9	2,31
		Stop	27. Feb	08:15	20°50.699	21°15.922	no	7,5	214,0	46	9,3	4,56
3	**3**	**Start**	27. Feb	08:27	20°50.653	21°15.711	no	station	303,0	338	9,4	4,56
		Stop	28. Feb	09:39	18°44.405	20°44.51	no	station	13,80	354	8,6	6,98
4	**4**	**Start**	28. Feb	09:55	18°44.313	20°44.51	no	station	17,60	348	9,0	6,98
		Stop	01. Mar	08:01	18°00.315	20°35.278	no	6,9	282,7	57	9,2	9,00
5	**5**	**Start**	01. Mar	08:16	18°02.583	20°35.727	no	8,9	279,0	359	9,8	9,00
		Stop	02. Mar	08:18	21°00.020	19°09.998	no	station	4,6	354	5,5	10,16
6	**6**	**Start**	02. Mar	08:18	21°00.0167	19°09.998	no	station	3,9	352	4,7	10,16
		Stop	03. Mar	08:03	19°14.611	20°22.637	no	8,7	52,3	357	6,9	12,57
7	**7**	**Start**	03. Mar	08:16	19°13.008	20°23.731	no	9	54,78	355	6,2	12.,57
		Stop	04. Mar	08:31	18°30.002	20°39.996	no	station	26,7	18	8,5	14,62
8	**8**	**Start**	04. Mar	08:45	18°30.009	20°39.997	no	station	30,1	6	9,0	14,62
		Stop	05. Mar	08:20	26°17.484	20°31.117	yes	8,5	301,1	355	9,3	16,60
9	**9**	**Start**	05. Mar	08:48	17°52.358	20°32449	no	8,2	295	355	9,6	16,60
		Stop	06. Mar	08:16	17°39.418	22°56.179	no	8,5	7,2	337	6,6	18,91
10	**10**	**Start**	06. Mar	08:36	17°39.010	22°58.954	no	8,9	9,2	332	6,4	18,91
		Stop	07. Mar	08:35	16°69320	26°04.386	no	9,3	26,0	89	1,3	21,25

2.2. Marine Microbiology

2.2.1. Vertical export and aggregation of lithogenic material *(M. Iversen)*

The marine area off Cape Blanc (Mauritania, NW Africa) receives large input of airborne dust from the Sahara. Recently it was recognised (e.g., IPCC Report 2007) that aerosols are huge players in global climate change via their *direct* effects on global climate through blocking of incoming solar radiation, trapping of reflected heat, and changing the Earth's albedo, as well as their *indirect* effects through changing the ocean's carbon cycle by fertilisation of marine life or by ballasting organic-rich particles. Thus, it is important to understand the transport paths of the Saharan aerosols, both from the atmosphere-ocean interaction and the vertical export of lithogenic material from the surface to the deep ocean. Further, recent observations have shown that vertical downward fluxes of ballast minerals (e.g. dust, carbonate, opal, and lithogenic material) are closely correlated to fluxes of organic carbon in the bathypelagic zones. These observations have lead to the hypothesis that marine organic carbon export is determined by the presence of ballast minerals within large settling aggregates (> 0.5 mm) (Armstrong et al. 2002, Francois et al. 2002, Klaas and Archer 2002). This has lead to the suggestion that areas with high concentrations of ballast minerals, e.g. off Cape Blanc, have higher carbon export due to increased aggregate density and sinking velocity when ballast minerals are incorporated into the aggregates and/or due to protection of the organic matter within the aggregates via quantitative association to ballast minerals. However, the direct effects of ballast minerals on sinking velocity and degradation rates of settling organic aggregates are still unclear.

During POS-396, marine aggregates were formed from different areas and different water depth, to investigate the influence from changing concentrations of lithogenic material on aggregate formation, size, and sinking velocity. These parameters will be correlated to the content of lithogenic material within the aggregates. From these result, we can identify the influence from lithogenic material on aggregate processes and gain understanding of the controlling parameters on vertical fluxes of lithogenic material in the ocean. In addition, samples were prepared for microscopic quantification of lithogenic material at different water depths. Table 2 shows the stations and depths where water was collected for aggregate formation using roller tank incubations on board. The water depths and stations where water filtrations were made for the microscopic investigations of lithogenic material are indicated as "Lith. Filt.".

Table 2. List of stations, sample depths, sample volume, and analysis performed at the different stations. RT indicates roller tank incubations for aggregate formation and Lith. Filt. indicates samples prepared microscopic quantifications of lithogenic material in the water.

Station GeoB	**sample depth (m)**	**sample volume (L)**	**analysis**
14201_6	400	16	RT
14202_6	45	16	RT
	45	2	Lith. Filt.
	150	2	Lith. Filt.
	300	2	Lith. Filt.
	600	2	Lith. Filt.
	1000	2	Lith. Filt.
	1900	2	Lith. Filt.
	2200	2	Lith. Filt.
	2650	2	Lith. Filt.
14204_3	400	16	RT
	100	2	Lith. Filt.
	200	2	Lith. Filt.
	400	2	Lith. Filt.
	750	2	Lith. Filt.
	1000	2	Lith. Filt.
14204_4	65	16	RT
14207_2	45	16	RT
	20	2	Lith. Filt.
	45	2	Lith. Filt.
	70	2	Lith. Filt.
	100	2	Lith. Filt.
	300	2	Lith. Filt.
	500	2	Lith. Filt.
14209_2	15	16	RT
	15	2	Lith. Filt.
	75	2	Lith. Filt.
	200	2	Lith. Filt.
	250	2	Lith. Filt.

2.2.2. Bacterial community structure within aggregates and bulk water at different water depths *(S. Thiele and M. Iversen)*

Previous results from investigations of aggregated carbon and degradation have showed very low degradation rates at depths below 200 m (Iversen et al. 2010), thus, giving rise to the question of who the major players in the degradation of organic carbon are. Beside copepods and other higher animals, bacteria are suggested to play a major role in the recycling of POC to DOC (Oliver et al., 2004). During POS 396, we wanted to gain insight into how bacterial community composition might change within marine aggregates at different regions and different water depths. The aggregates where formed in roller tanks on board using water collected at different depths and areas (see Iversen, this cruise report POS 396). Bulk water samples from the same depth and area as used for aggregate formation were taken and filtered in fractions of 10 µm, 3 µm, and 0.2 µm in order to compare the free living bacterial community with the attached ones. Additionally, depth profiles were sampled at different stations to investigate the bacterial distribution and composition through the water column

(Table 3). Since the aggregates generated in roller tanks are artificial, a drifting sediment trap was deployed to collect marine snow aggregates at 400 m depth during a 6 day period. Unfortunately the satellite transmitter signal was lost after deployment and the system could not be recovered.

The samples will be processed at MPI in Bremen using the technique of CAtalized Reporter Deposition Fluorescence *In Situ* Hybridization (CARD-FISH). This method is based on oligonucleotide probes, labeled with horseradish-peroxidase, which match specific sequences of 16S rRNA with various levels of resolution down to the species level. After binding of the probe labeled tyramide is used to enhance the signal (Amann et al., 1990; Amann and Fuchs, 2008). Thereby the determination of different taxonomic clades is possible and, thus, bacterial compositions on the aggregates and in the bulk water can be investigated. Further, samples were taken to investigate the rare fraction of bacteria in the water column and to set up clone libraries for investigations of the bacterial diversity at interesting depths. Table 3 shows the stations and depths where samples were taken. For overview of sampled stations for aggregate formation see the report of Iversen in this volume (chapter 2.2.1.).

Preliminary data for a depth profile of bacterial abundance was done during the cruise and is shown in Figure 2. Total cell counts were calculated from counts of DAPI stained cells, while abundance of bacteria was calculated from cells counts stained with the oligonucleotide probe EUB I-III (Amann et al. 1990; Daims et al., 1999) and DAPI stained cells. A decrease of total cell counts from the upper layer to the lower layers was found while bacterial abundance showed fluctuations down through the water column.

Table 3. List of all samples taken during POS 396.

Station data		**Sample #**	**Sample depth [m]**	**Volume 0.2 µm fraction batch 1# [ml]**	**Volume 0.2 µm fraction batch 2# [ml]**	**Volume 3 µm fraction [ml]**	**Volume 10 µm fraction [ml]**
GeoB-14201							
Date	27.02.2010	1	20	20	20	100	100
Time (local)	12:30	2	45	20	20	100	100
Lat.:	21°15.69 N	3	100	20	20	100	100
Long.:	20°50.68 W	4	200	50	50	100	100
Total depth	4154m	5	400	50	45	95	100
		6	500	100	100	200	100
		7	700	50	50	100	100
		8	1500	50	50	100	100
		9	2500	50	50	100	100
		10	3500	50	50	100	100
		11	4100	50	50	100	100
		I	4100	900			
		II	700	900			
		III	400	900			
		IV	45	900			
		A	45	500			
		B	400	500			
		C	700	500			
		D	4100	500			

Table 3. continued

Station data		Sample #	Sample depth [m]	Volume 0.2 µm fraction batch 1# [ml]	Volume 0.2 µm fraction batch 2# [ml]	Volume 3 µm fraction [ml]	Volume 10 µm fraction [ml]
GeoB-14202							
Date	28.02.2010	1	20	50	missing	200	200
Time (local)	19:30	2	45	50	50	200	200
Lat.:	20°44.59 N	3	150	50	missing	200	200
Long.:	18°43.11 W	4	300	50	50	200	200
Total depth	2700m	5	600	50	50	200	200
		6	1000	100	100	200	200
		7	1900	100	100	200	200
		8	2200	100	100	200	200
		9	2650	100	100	200	200
		1a	45	50	50		
		2a	45	30	30		
		3a	45	20	20		
		I	2650	900			
		II	1900	900			
		III	45	900			
		A	2650	500			
		B	1900	500			
		C	45	500			
GeoB-14204							
Date	02.03.2010	1	65	50	50	200	200
Time (local)	17:45	2	100	100	100	200	200
Lat.:	19°09.99	3	200	100	100	200	200
Long.:	29°59.99	4	400	100	100	200	200
Total depth	3379m	5	750	100	100	200	200
		6	1000	100	100	200	200
		I	400	1000			
		A	400	1000			
GeoB-14207							
Date	04.03.2010	1	20	20/50	20/50	100/ 200	100/ 200
Time (local)	13:45	2	45	20	20	200	200
Lat.:	20°35.28 N	3	70	20	20	200	200
Long.:	17°49.98 W	4	100	50	50	200	200
Total depth	764m	5	200	100	100	200	200
		6	300	100	100	200	200
		7	500	100	100	200	200
		8	700	100	100	200	200
		I	45	1000			
		A	45	1000			
GeoB-14209							
Date	05.03.2010	1	250	20	20	200	200
Time (local)	07:30	2	200	20	20	200	200
Lat.:	20°29.96 N	3	150	20	20	200	200
Long.:	17°43.94 W	4	100	50	50	200	200
Total depth	270	5	75	100	100	200	200
		6	45	100	85	200	200
		7	15	100	100	200	200
		I	250	1000			
		II	100	1000			
		III	45	1000			
		A	250	1000			
		B	100	1000			
		C	45	1000			

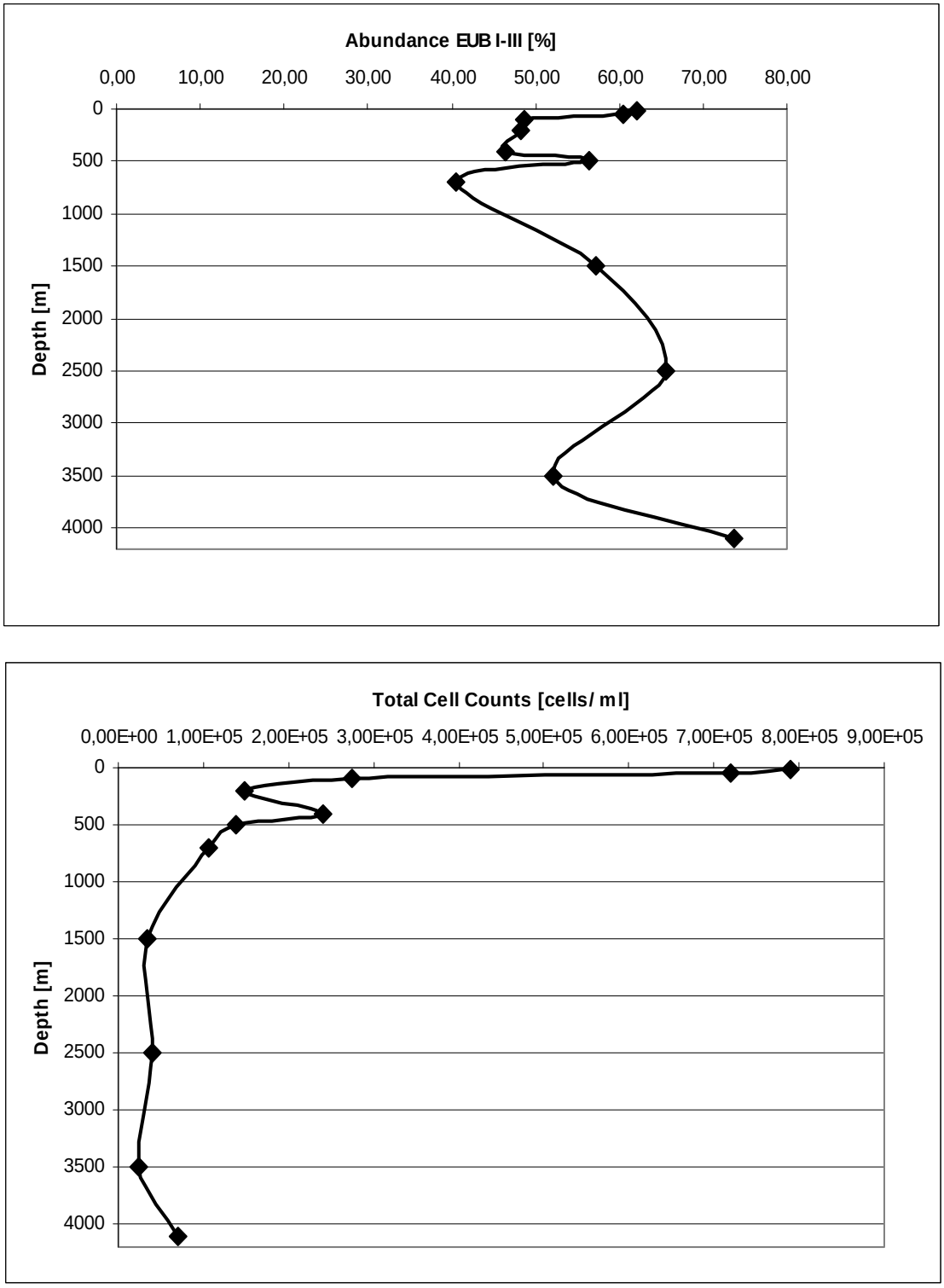

Fig. 2. Depth profile of station GeoB-14201. The upper graph shows abundance of EUB I-III stained cells with depth. The lower graph shows total cell counts per ml with increasing depth.

2.3. Organic Biogeochemistry

2.3.1. Alteration and age of organic matter in the water column *(A. Basse)*

The relationship between marine production, flux of organic matter (OM) and burial in the sediments are well documented from sediment trap and core top data. However, recent studies emphasize that lateral transport and alteration of OM in the water column have a strong influence on the OM-flux. To better understand these processes, filtrations of particulate organic matter from different water depths were done using samples which have been collected with a multiple water-sampler (rosette) (Table 4), *in situ*-pumps (Table 5), and from the ships' inlet (Table 6). Sample analysis will be performed in the home laboratories at the University of Bremen and the data will be compared to results from previous expeditions. The analysis will focus on the composition of the OM collected with filters, with special emphasis on the concentrations of specific biomarkers. The key objectives of the investigations are:

- What is the composition of particulate organic matter in the water column and the underlying surface sediments?
- What is the influence of lateral transport (e.g. in nepheloid-layers) on open-ocean mass fluxes and where does this material originate?
- What is the contribution of pre-aged material to deep-ocean particle fluxes?
- How do alteration and dissolution processes during sinking and resuspension influence the composition of organic matter?

Table 4. Samples filtered from the water of the shipboard rosette (ROS-CTD SBE 3, station list)

Station	Filter number	Depth (m)	Volume (L)
GeoB 14201-6	1	400	4,1
GeoB 14201-6	317	20	4
GeoB 14201-6	3	20	3
GeoB 14201-6	4	500	4,5
GeoB 14201-6	5	500	3
GeoB 14201-6	291	100	4
GeoB 14201-6	292	200	4
GeoB 14201-6	293	700	4
GeoB 14201-6	6	45	3
GeoB 14201-6	7	100	3
GeoB 14201-6	8	200	2
GeoB 14201-6	9	700	2
GeoB 14201-6	10	1500	3
GeoB 14201-6	11	2500	3
GeoB 14201-6	12	3500	1,9
GeoB 14201-6	13	4100	2

Table 4. continued.

Station	Filter number	Depth (m)	Volume (L)
CBi			
GeoB 14202-6	80	20	4,8
GeoB 14202-6	79	20	0,23
GeoB 14202-6	78	150	5
GeoB 14202-6	77	150	1
GeoB 14202-6	76	1900	4
GeoB 14202-6	75	1900	0,85
GeoB 14202-6	74	2200	4
GeoB 14202-6	73	2200	1
GeoB 14202-6	72	2620	3
GeoB 14202-6	71	2620	0,35
GeoB 14202-6	70	300	3
GeoB 14202-6	69	300	0,5
GeoB 14202-6	68	2000	3
GeoB 14202-6	67	2000	1
GeoB 14202-6	94	1000	5
GeoB 14202-6	93	1000	1
GeoB 14202-6	92	600	3
GeoB 14202-6	91	600	2
GeoB 14202-6	90	45	3
GeoB 14202-6	89	45	3
GeoB 14204-3	88	1000	5
GeoB 14204-3	87	1000	1
GeoB 14204-3	86	200	5
GeoB 14204-3	85	200	1
GeoB 14204-3	84	750	5
GeoB 14204-3	83	750	1
GeoB 14204-3	82	400	4,4
GeoB 14204-3	81	400	1
GeoB 14204-3	24	65	4,475
GeoB 14204-3	23	65	1
GeoB 14204-3	22	100	5
GeoB 14204-3	21	100	1
700m (Slope)			
GeoB 14207-2	20	700	4,7
GeoB 14207-2	19	700	1
GeoB 14207-2	18	500	4
GeoB 14207-2	17	500	0,88
GeoB 14207-2	16	300	4
GeoB 14207-2	15	300	1
GeoB 14207-2	14	200	2,5
GeoB 14207-2	13	200	0,8
GeoB 14207-2	37	100	3,5
GeoB 14207-2	36	100	1

Table 4. continued.

Station	Filter number	Depth (m)	Volume (L)
GeoB 14207-2	35	70	4
GeoB 14207-2	34	45	4
GeoB 14207-2	33	45	1
GeoB 14207-2	32	20	1,53
GeoB 14207-2	31	20	0,6
270m (shelf)			
GeoB 14209-2	29	250	3
GeoB 14209-2	28	250	0,5
GeoB 14209-2	27	150	3
GeoB 14209-2	26	150	1
GeoB 14209-2	39	15	2,48
GeoB 14209-2	40	15	1
GeoB 14209-2	41	Blank	1
GeoB 14209-2	42	Blank	1

Table 5. Samples filtered with *in situ*-pumps.

Station	Water depth (m)	Filtered Volume (L)
GeoB 14201-5	4120	1416,13
	3500	2028,24
	2500	1456,25
	1500	1757,31
	700	1730,13
	500	did not pump
	200	869,82
	45	811,29
GeoB 14205-2	2620	1102,76
	2200	1137,69
	2000	1039,82
	1900	1182,87
	1000	1095,86
	300	1271,90
	150	591,32
	45	410,68
GeoB 14210-1	720	1220,40
	600	839,68
	300	945,62
	170	984,14
	100	450,85
	45	636,31

Table 6. Samples filtered from the ships' inlet.

Nr.	Lat. Start	Lat. End	Long Start.	Long. End	Counter Start	Counter End.	Volume (L)	Temperature (°C)
1	25° 15.50'	25°06.97'	017°31.62'	017°38.84'	7330	7427	97	21,40
2	23° 58,06'	23°50.25'	018°36.77'	018°43.30'	7449	7541	92	22,30
3	20°15.15'	21°50.21'	020°15.19	020°22.88'	7554	7648	94	21,70
4	21°16.6787'	21°16.6787'	020°50.777'	020°50.777'	7658	7735	77	23,50
5	21°15.663'	21°15.663'	020°51.057'	020°51.057'	7753	7846	93	23,30
6	20°44.5121'	20°44.5121'	018°44.3838'	018°44.3838'	7851	7925	74	21,90
7	20°35,66'	20°37.05'	018°02.16'	018°12.22'	7955	8006	51	21,30
8	19°09.9870'	19°09.9870'	021°00.025'	021°00.025'	8013	8131	118	22,90
8a	19°09.9870'	19°09.9870'	021°00.025'	021°00.025'	8131	8239	108	22,90
9	20°26.42'	20°38.20'	019°09.04'	018°15,20'	8315	8408	93	21,50
10	20°39.9762'	20°39.9762'	018°29.9951	018°29.9951	8458	8510	52	21,60
11	20°35.3748	20°35.3748	017°59.700'	017°59.700'	8539	8599	60	21,00
12	20°30.97'	20°35.00'	017°47.88'	017°59.99'	8675	8770	95	21,10

2.4. Optical Studies

2.4.1. Acquiring vertical particle abundances with the improved profiling camera system ParCa-Pro *(N. Nowald, G. Ruhland, C. Reuter)*

System description:

During RV Poseidon Cruise 396, an improved version of the vertically profiling particle camera system, called ParCa-Pro, was deployed. The improved version of the system is equipped with a Kodak ProBack, 16 Megapixel digitilization unit behind the optics of an analogue Photosea, 60 mm middle format camera. The system has a 5 times higher resolution compared to the old ParCa system. The optical setup and control unit is similar to the old camera. The strobe is mounted perpendicular to the optical axis of the camera.. It provides a collimated light beam of 12 cm width, illuminating a known sample volume of about 12 l. The camera is controlled by a microcontroller and a SeaBird SBE 36 telemetry unit via PC over the ships coxial wire. The camera receives the depth information via a SBE-19 CTD, which is mounted to the frame of the ParCa-Pro and triggers the camera in depth intervals of 10 m. The CTD also collects data of the water temperature, salinity, oxygen, turbidity and chlorophyll fluorescence. Power is supplied by a 24V/38Ah rechargeable lead battery and overall weight of the system is 250 kg. The camera was deployed along an east-west transect in the working area and a detailed station list is given below (Table 7). To test the new system (e.g. adjusting the focus), several test profiles had to be taken (see station list chapter 3.).

Table 7. List of ParCa-Pro profiling stations (with Seabird SBE-19 CTD with oxygen, fluorescence and turbidity).

GeoB #	Date	Deploy time [UTC]	Latitude	Longitude	Water depth [m]	Profile length (m)
14201	26.02.10	21:22	21°18,06N	20°50,33W	4168	2000
14202	28.02.10	09:23	20°44,83N	18°43,84W	2757	2720
14203	01.03.10	07:00	20°35,10N	18°00,10W	765	720
14204-1	02.03.10	08:00	19°09,97N	21°00.00W	3340	3270
14204-2	02.03.10	12:15	19°09,97N	21°00.00W	3340	2000
14206	04.03.10	06:30	20°39,99N	18°29,99W	1770	1580
14208	04.03.10	18:20	20°42,55N	18°34,36W	2200	2130
14209	05.03.10	06:20	20°29,97N	17°43,95W	277	250

Preliminary results:

The camera was deployed prior to the *in situ*-pumps and CTD-rosette in order to locate interesting water depths with higher particle concentrations. We were able to trace a midwater particle cloud upslope along an east-west transect in the proximity of mooring site CBi (see Fig. 1 and station list). The particle cloud is found at 1900 m at station GeoB 14202 and 1700 m at site GeoB 14208 (Fig. 3). The cloud may have detached in the area of ParCa-Pro station GeoB 14206 from the seafloor and is then advected farther offshore. Studies of the water samples taken in these specific depths will be analysed in the laboratory with respect to composition, degradation rates and other particle specific properties. The camera's measurements show good correlation between the particle abundance from ParCa-Pro and the natural turbidity (SBE 19 CTD, WETLAPS turbidity sensor) in all profiles. One example is given in Fig. 3 for GeoB site 14202 (eutrophic sediment trap site CBi). The distinct particle maxima seen around 1900 m water depth is well reflected by an increase of the turbidity. Additional maxima for both parameters can be observed in water depths between 2050 m and 2350 m. This correspondance was not found with the old ParCa system and can be explained by a five times higher resolution of the new system. Due to the increased resolution of the camera, the system is able to detect particles within the detection limits of the turbidity sensor.

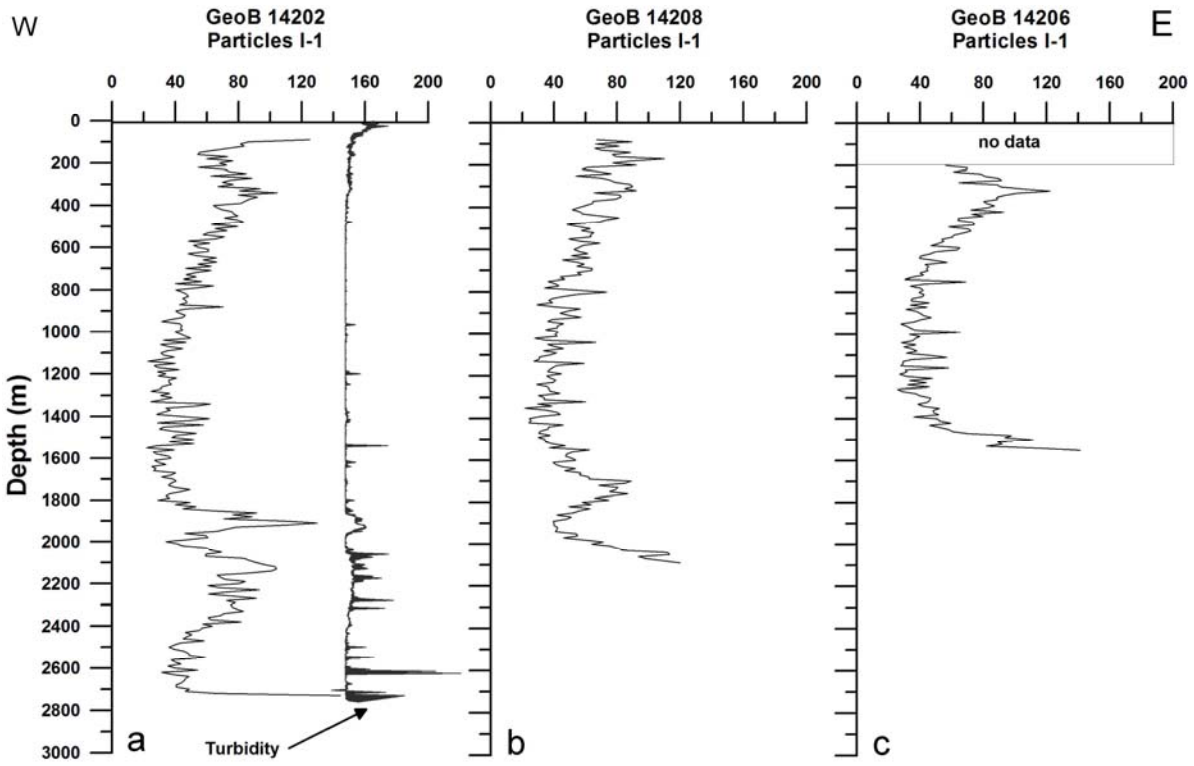

Fig. 3. West-east transect of camera profiles (ParCa-Pro) off Cape Blanc showing deep-water particle maxima moving upwards in direction to the shelf area (E). Note the good correspondence between turbidity and particle concentrations measured with ParCa-Pro in the deeper water column at GeoB 14202.

2.4.2. Particle investigations with the ROV *Cherokee*

(N. Nowald, C. Reuter, G. Ruhland, M. Klann)

The ROV Cherokee was taken onboard and was mobilised in order to carry out *in situ* sinking speed measurements of marine particles. This has been done during two previous cruises (see reports of RV cruise Poseidon 344 and RV Poseidon cruise 365). Due to bad weather conditions, it was not possible to deploy the vehicle within the short time frame this time, and hence, no data were collected. More deployments and measurements with the ROV are planned during future cruises.

2.5. Oceanography and Marine Geology

2.5.1 CTD-O_2-chlorophyll-fluorescence-turbidity probes (SBE 19)

(M. Iversen, N. Nowald, C. Reuter, M. Klann, G. Fischer)

Eight CTD/O_2/chlorophyll-fluorescence-turbidity profiles were taken with a self-contained Seabird SBE 19 profiler equipped with a conductivity-temperature-depth probe plus oxygen sensor and a turbidity fluorescence sensor (from WETLABS) (Table 7 and station list in chapter 3). The SBE-19 CTD was attached to the ParCa-Pro frame (chapter 2.4.1.) and prior to the cruise the CTD sensors were calibrated and some internal changes have to be made to connect the new sensor. The data were removed immediately after recovery of the system and standard downcast plots were made. We had some problems with the output of the external voltages and the oxygen, chlorophyll fluorescence and turbidity were too low (e.g. oxygen in Fig. 4). Therefore, the values for oxygen and turbidity are given on an arbitrary scale.

One example from the eutrophic mooring site CBi-7 and a site farther to the east is given below (GeoB 14202-3 and 14208-1, Fig. 4) showing high particles concentration in the subsurface layer which nicely correspond between the two profiles. The particle maxima in the deep water column are higher when approaching the coast to the east due to the source of particles in the shelf area. In the home lab, we will make a post calibration to recalculate the data and get absolute numbers for oxygen and turbidity.

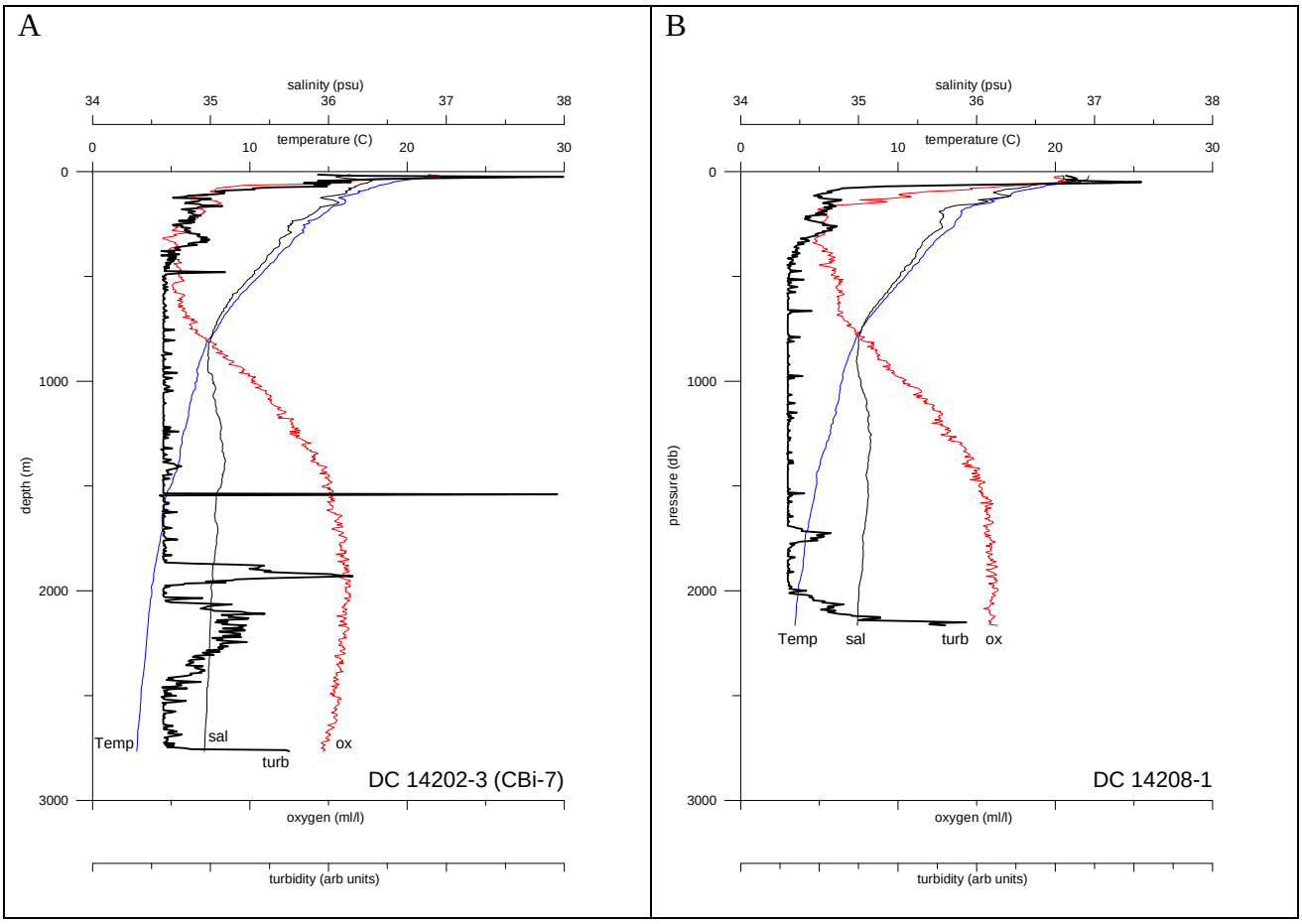

Fig. 4. Two downcast CTD-profiles taken at the eutrophic mooring site CBi-7 (a: GeoB 14202-3) and farther to the east (b: GeoB 14208-1) (see also Fig. 1 and station list) with the the SBE-19 (attached to the ParCa-Pro frame). Oxygen and turbidity are given only as relative numbers and absolute values have to be calculated with a post-calibration file. Note the corresponding high turbidity in the subsurface layer (< 500m) which partly correspond to lower oxygen values. Turbidity peaks in the deeper water column of at site CBi-7 (a) are higher in the water column farther to the east.

2.5.2. Rosette and CTD-O_2 probes (shipboard SBE 3) *(M. Iversen, S. Thiele)*

Seven profiles with the shipboard SBE 3-CTD were acquired (Table 8, see station list in chapter 3) which was equipped with oxygen sensors and was launched together with the multiple water collectors (rosette with 12 x 8 l bottles). Water samples were taken for incubations in roller tanks (see chapter 2.2.1., Table 2) to perform artificial aggregates and for the organic geochemistry of particles in the water column (chapter 2.3.1., Table 4).

Table 8. List of CTD-O_2-chlorophyll profiles taken with the ships' SBE 3-CTD. Water samples were taken for microbial and organic chemistry analysis. (2.2.2. and 2.3.1.)

Station No. GeoB	Lat N	Long W	Water depth (m)	Water depths of samples (m)
14201-6	21°15.8	20°50.6	4158	20, 45, 100, 200, 400, 500, 700, 1500, 2500, 3500, 4120
14202-6	20°44.6	18°43.0	2717	20, 45, 150, 300, 600, 1000, 1900, 2000, 2200, 2600
14204-3	19°10.0	20°59.9	3340	100, 200, 400, 750, 1000
14204-4	19°10.0	21°00.0	3339	65
14207-1	20°35.0	18°00.0	765	Test 20m
14207-2	20°35.4	18°00.0	762	20, 45, 75, 100, 200, 300, 500, 700
14209-2	20°30.0	17°43.9	278	20, 45, 70, 100, 150, 200, 250

2.5.3. Particle fluxes collected with sediment traps

(G. Ruhland, G. Fischer, N. Nowald, M. Klann, C. Reuter)

It was planned to recover and redeploy the moorings CB-20/-21 which were located about 200 nm off Cape Blanc (Mauritania). This mesotrophic site is operated since 1988 and is located at the edge of the Cape Blanc filament in about 4100 m water depth. The position is used to record long-term changes in mass fluxes in the Mauritanian offshore upwelling zone. The mooring CB-20 was deployed during the Maria S. Merian cruise 11/2 on April 3rd, 2009. An additional mooring named CBi-7 was deployed during Maria S. Merian cruise 11/2 80 nm farther to the east and was also planned to be exchanged to CBi-8. The data of deployments and recoveries of the moorings are listed in Table 9 alongside with the sampling data of the traps. On February 26th, the mooring CB-20 about 200 nm off Cape Blanc was successfully recovered. The upper trap sampled 19 cups due to a later planned recovery at the end of March 2010. The lower trap did not work for unknown reasons. The mooring was redeployed as CB-21 with a similar configuration on the next day.

In the morning of February 28th, we released the 1500 m long mooring array CBi-7 in the coastal part of the Cape Blanc filament which was equipped with two traps including a MSD (Multi-Sensor-Device) trap with 40 cups and a sensor platform on which a FSI-CTD (with ACP) and a video camera system were installed. The camera system should monitor particle distribution and transport as well as particle sizes over an annual cycle. Due to an assumed recovery date at the end of March 2010 a set of 37 samples (instead of 40) of CBi-7 from the upper water column could be received. The lower trap delivered 19 samples for the same reason. On March 3rd, 2010, the mooring array CBi-8 could be redeployed as CBi-7 with the MSD trap but not with the MSD-platform. It is planned to recover and redeploy this mooring with RV POSEIDON at the end of March or beginning of April 2011.

Table 9. Data for recoveries and redeployments of the sediment trap mooring arrays.

Mooring	Position	Water Depth (m)	Interval	Instr. (m)	Depth (no x days)	Intervals
Mooring recoveries						
Cape Blanc mesotrophic:						
CB-20	21°15,64' N	4170	03.04.09-	SMT 234	1224	1x16, 19 x18
	20°50,74' W		27.03.10	SMT 234	3632	1x16, 19x18
Cape Blanc eutrophic:						
CBi-7	20°44.56' N	2761	01.04.09-	MSD + platform	1361	40 x 9
	18°42.70' W		27.03.10	SMT 234	1931	20 x 18
Mooring deployments:						
Cape Blanc mesotrophic:						
CB-21	21°15.60' N	4155	28.02.10-	SMT 234	1209	20x20
	20°50.90' W		04.04.11	SMT 243Ti NE	3617	20x20
Cape Blanc eutrophic:						
CBi-8	20°44.45' N	2720	06.03.10-	MSD trap	1299	1x4, 38x10
	18°42.78' W		04.04.11	SMT 234	1869	1x14, 19x20

Instruments used:

SMT 234 = Sediment trap, KUM, Kiel

MSD = Multi-Sensor-Device trap with 40 cups

MSD platfrom = platform with FSI-CTD and video camera

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3. Station List (POS 396)

GeoB #	Ships #	Date 2010	Device	Time seafloor/ max. wire -length [UTC]	Latitude N	Longitude W	Water depth [m]	Recovery/Remarks
14201-1		26.02.	ParCa-Pro + CTD	15:29	21°16.10’	20°51.13’	4166	Test 5m, CTD out
14201-2			ParCa-Pro + CTD	15:37	21°16.13’	20°51.00’	4162	Tests down to 10m, CTD out
14201-3			CB-20	16:02	21°15.58’	20°50.75’	4156	Upper trap #19, lower empty
14201-4			ParCa-Pro + CTD	21:22	21°18.08’	20°50.33’	4168	Profile to 2000m
14201-5		27:02	ISP	00:03	21°17.39’	20°50.48’	4170	8 depths (4h pumping) in: 4120, 3500, 2500. 1500, 700, 500, 200, 45m. 500m pump failed
14201-6		27.02.	ROS + CTD	8:48	21°15.80’	20°50.57’	4158	samples in : 4120, 3500, 2500, 1500, 700, 500, 400, 200, 100, 45, 20m
14201-7			CB-21	13:00	21°15.60’	20°50.90’	4155	Start: deployment with 2 traps
14201-8			ParCa-Pro + CTD	15:32	21°15.66’	20°51.06’	4156	Tests 1-4 down to 10m
14202-1		28.02.	ParCa-Pro + CTD	08:07	20°44.83’	18°43.85’	2756	Test down to 200m
14202-2			ParCa-Pro + CTD	08:39	20°44.69’	18°43.88’	2759	Test down to 200m
14202-3			ParCa-Pro + CTD	11:39	20°44.59’	18°43.99’	2750	Profile to 2720m, bottom contact
14202-4			CBi-7	13:08	20°44.18’	18°42.56’	2699	Realease, upper trap at #38, lower at #19
14202-5			CBi-DF1	16:02	20°42.22’	18°42.91’	2717	Deployment: drifting trap (DF) at 400m (4 cups)
14202-6			ROS + CTD	18:02	20°44.60’	18°43.04’	2717	samples in: 20, 45, 150, 300, 600, 1000, 1900, 2000, 2200, 2600m
14203-1		01.03.	ParCa-Pro + CTD	07:33	20°35.02’	18°00.00’	764	Down to 720m
14204-1		02.03	ParCa-Pro + CTD	10:37	19°10.00’	21°00.00’	3342	Down to 3300m, pictures down to 200m only
14204-2			ParCa-Pro + CTD	13:59	19°10.02’	21°00.00’	3340	Down to 2000m
14204-3			ROS + CTD	16:21	19°10.01’	20°59.99’	3340	Samples in: 1000, 750, 400, 200, 100m
14204-4			ROS + CTD	17:30	19°10.00’	21°00.01’	3339	Down to 65m
14205-1		03.03	CBi-8	13:10	20°44.45’	18°42.78’	2720	Start deployment of mooring with 2 (1 MSD) traps
14205-2			ISP	16:27	20°43.15’	18°41.75’	2701	8 depths (3h pumping) in: 2620, 2200, 2000, 1900, 1000, 300, 150, 45m
14206-1		04.03.	ParCa-Pro + CTD	08:00	20°39.98’	18°29.96’	1762	Down to 1713m
14207-1		04.03.	ROS + CTD	12:41	20°34.99’	17°59.99’	765	Test down to 20m after cable repair
14207-2		04.03.	ROS + CTD	13:20	20°35.36’	17°59.97’	762	Samples in: 700, 500, 300, 200, 100, 75, 45, 20m
14208-1		05.03	ParCa-Pro + CTD	20:05	20°42.55’	18°34.34’	2207	Down to 2150m
14209-1		06:03	ParCa-Pro + CTD	06:34	20°29.98’	17°43.95’	278	Down to 250m
14209-2			ROS + CTD	07:29	20°29.98’	17°43.95’	278	Samples in 20, 45, 70, 100, 150, 200, 250m
14210-1			ISP	10:29	20°35.03’	17°59.97’	764	6 pumps (3 h pumping) in: 45, 100, 170, 300, 600, 720m

Abbreviations for station list

CB, CBi:	meso- and eutrophic sediment trap moorings off Cape Blanc (Mauritania)
CBi-DF1:	Drifting trap (DF) deployed at eutrophic CBi site
ROS-CTD:	Multi-water sampler (Kiel rosette) with 12 x 8l bottles and CTD-SBE 3 (IFM-GEOMAR)
PARCA-PRO-CTD:	Particle Camera System with CTD-SBE 19 inside frame (CTD-O_2- chlorophyll-fluorescence-turbidity (SBE-19, #2069; WETLABS turbidity-chlorophyll sensor)
ISP:	*in-situ* pumps (8)

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